Tevatron collider progress: March to early May 2002

I. Luminosity: → early Mar (stores #1036-1045)
Average initial peak L=10.24
→ early May (stores #1280-1289)
Average initial peak L=16.78
or 64% increase =
+40% due to Sequence 13 fix
+10% due to better coalescing in MI
+10% due to better p-lifetime at 150 GeV

II. Reliability: → no irreversible failures
→ RF glitch on March 30 → CDF silicon damage
frequent mini-glitches, σ_S blow up
→ F11 vacuum increases losses by 50%
→ TEL HV PS failure ← spare on its way
still able to clean DC beam
→ Separator failure (40% *L*-drop)

III. Technical progress:

- → Pbar losses at "Sequence 13" fixed
- → P and p̄ apertures are measured on inj helix, (tight @ C0), opened a bit by separators
- → Orbits/tunes/coupling smoothed on modified injection and collision helices
- → Octupoles help to increase p-lifetime@150
- → Long/trans noise, vacuum, collimators studies
- → Diagnostics: SDA – great progress, Tev orbit, FWires≈OK, Tan's Q-meter much better

IV. Issues:

- → p, pbar lifetime @ 150 GeV, ramp
- → background @ CDF
- → transverse and longitudinal stability
- → transverse and longitudinal injection tune-up
- → diagnostics (SyncLite, minor for FBI/SBD)
- → open aperture at C0 (new magnets), F0, etc
- → vacuum improvement
- → lattice changes due

Previous “Expectations” (March 2002):

p, pbar lifetime @ 150 GeV improved in 3 months
(open aperture, correct tunes&coupling, feeddowns for pbars)
→ some 10-15% improvement in luminosity (at current intensities)

pbar loss at Seq.13 reduced (the first attempt) in 2 months
(optimized separators, parsing squeeze, feeddowns for pbars)
→ some 20% improvement in luminosity (at current intensities)

pbar emittance and intensity improved in 2-3 months
(pbar sorce optimization, MI transfer)
→ some 20% improvement in luminosity

Luminosity of 2e31 in May-June 2002

SyncLite, SBD, orbit oscillations detector in 3 months

V. Expectations:

p, pbar lifetime @ 150 GeV, loss@ramp improved in 2-3 mos

(octupoles, “new new” helix, adjust tunes&coupling)

→ some 15-20% luminosity increase

more protons from MI in 1 month

→ some 15-20% luminosity increase

injection tune-up in 2 mos

(better closure, MI→ Tev pbar eff, injection dampers)

→ some 10-20% improvement in luminosity

pbar intensity and emittance improved in June

(pbar cooling)

→ some 20-40% improvement in luminosity in August

Luminosity of 2.5e31 before June shutdown

3.5e31 in September

Vacuum improved by factor of 3 in two steps June, Oct

Aperture opened in June(F0), Oct (C0)

SyncLite, Collimators, SBD, BLT expect progress in 3mos